

following suggestions, which are here reprinted with a view to their being of use in a wider field :—

Recommendations regarding Mathematical Notation and Printing.

Always,
instead of

$$\frac{x}{3} \quad \frac{a+b}{2} \quad \frac{a+\frac{b}{2}}{\frac{c}{3}+\frac{d}{4}} \quad \frac{a}{b+\frac{c}{d}} \quad \sqrt{x} \quad \sqrt{-1} \quad \frac{1}{x} \quad \frac{1}{x^n}$$

write

$$\frac{1}{3}x \quad \frac{1}{2}(a+b) \quad \frac{a+\frac{1}{2}b}{\frac{1}{3}c+\frac{1}{4}d} \quad \frac{a}{b+c/d} \quad \sqrt{x} \text{ or } x^{\frac{1}{2}} \quad i \text{ or } i^1 \quad x^{-1} \quad x^{-n}$$

instead of

$$\overline{x.x+a} \quad \sqrt{x-y} \quad \frac{\pi x}{e^a} \quad \int_0^{\frac{\pi}{2}} \quad [n$$

write

$$x(x+a) \quad \sqrt{(x-y) \text{ or } (x-y)^{\frac{1}{2}}} \quad e^{i\pi x/a} \quad \int^{\frac{1}{2}\pi} \quad n!$$

In current ordinary text,
instead of

$$\frac{x}{a} \quad \frac{a+b}{c+d} \quad \frac{x}{v+\frac{1}{2}} \quad x/y + \frac{a}{b+c}$$

write

$$x/a \quad (a+b)/(c+d) \quad x/(y+\frac{1}{2}l) \quad \frac{x}{y} + \frac{a}{b+c}$$

Excessive use of the slanting line, or solidus, is, however, undesirable; it may often be avoided by placing several short fractions or formulas, with the intervening words if any, on the same line, instead of setting out each one on a line by itself. The last of the examples given above illustrates an improper use, in which symmetry is spoiled while nothing is gained; either both fractions should be written with the solidus, as $x/y+a/(b+c)$, or else neither as above.

The solidus should be of the same thickness as the horizontal line which it replaces; in some founts of type it is too thick and prominent.

Irregularities in the spacing of letters and symbols in the formulas as printed are often the cause of a general unsatisfactory appearance of the page.

For centimetres, millimetres, kilometres, grams, kilograms, the abbreviations should be cm., mm., km., gm., kgm. (not cms., &c.), and so in similar cases. Present custom is against the use of the signs ' and ' '.

Symbols which are not provided in the usual founts of type are, as a rule, to be avoided. Compounded symbols such as $\bar{a}$ or $\bar{a}$ usually involve justification, and are thus liable to become deranged or broken. The two examples here given have, however, become so essential that separate founts should be provided for them.

The use of a smaller fount for numerical fractions is now customary; thus always $\frac{1}{3}a$ instead of $a/3$. The use of negative exponents often avoids a complex fractional form; as also the use of the fractional exponents, such as $\frac{1}{2}$ and $\frac{1}{3}$. In the latter case $x^{\frac{1}{2}}$ is usually preferred to $x^{1/2}$, notwithstanding that the latter is more legible.

Much is often gained in compactness and clearness by setting out two or more short formulæ on one line, instead of on consecutive lines; in that case they should be separated by spaces, indicated by the sign $\sim$ on the MS. This would apply with even greater force to expressions such as $x=a, =b, =c$.

In the preface to his "Mathematical and Physical Papers," vol. i., 1880, the late Sir George Stokes successfully introduced the limited use of the solidus notation, obtaining the assent and support of Lord Kelvin, Prof. Clerk Maxwell, Lord Rayleigh, the editors of the *Annalen der Physik*, and many other mathematicians. He defined its use as restricted to the symbols immediately on the two sides of it, unless a brace or stop intervenes; thus $\sin \pi x/a$ is to mean $\sin(\pi x/a)$; but $\sin n\theta/r^n$, in case it is used, would mean $(\sin n\theta)/r^n$.

NOTES.

PROF. CLEVELAND ABBE, of the U.S. Weather Bureau, Washington, Dr. J. R. Sutton, of Kimberley, South Africa, and M. Léon Teisserenc de Bort, of Paris, have been elected honorary members of the Royal Meteorological Society.

At the meeting of the Royal Geographical Society on April 5, Sir Harry Johnston, who has just returned from his journeys through the southern States and the West Indies, will give a lecture on the scenery of Cuba, Haiti, and Jamaica, with many illustrations from photographs taken by himself.

THE death is announced, at the age of sixty-four years, of Prof. J. W. Moore, professor of physics in Lafayette College at Easton, Pennsylvania, since 1872.

SIR ROWLAND BLÉNNEHASETT, whose death at sixty-nine years of age we announce with great regret, was not only distinguished in his political career and historical studies, but also by his influence upon education in Ireland. For about seven years he was H.M.'s Inspector of Industrial and Reformatory Schools in Ireland. From 1897 to 1904 he was president of Queen's College, Cork, and in 1905 he was appointed a visitor of the college. He was a senator of the Royal University of Ireland in 1897, and was a member of the standing committee of the Senate. He was also one of the Commissioners of National Education in Ireland, and took an active part in the administration of that department down to the time of his death.

It should have been mentioned last week in the article on the Imperial Bureau of Ethnology (p. 73) that the Sirdar, Sir Reginald Wingate, is so impressed with the necessity of a thorough study of native conditions as the basis of good government that he has provided a grant for an investigation of the ethnology of the Sudan, especially from the sociological side. This work, which will extend over at least two winters, has been entrusted to Dr. C. G. and Mrs. Seligmann, who have recently made a joint investigation on the Veddas. Some of our colonial Governments also appreciate the value of such studies. For example, the expedition of the Seligmanns was financed by the Ceylon Government, and Mr. N. W. Thomas has been appointed Government ethnologist to Southern Nigeria, and is at the present time engaged in collecting information concerning the sociology and religion of that district.

THE honorary secretaries of the Zoological Society of Scotland (42 Frederick Street, Edinburgh), which has recently been founded, inform us that the society has been formed for the purpose of establishing a living zoological collection and garden at Edinburgh. The garden will be arranged on the system adopted by Herr Hagenbeck, of Hamburg, and will be conducted on scientific lines. When the society has developed sufficiently, it is within its scope to establish branch gardens in the other large towns in Scotland. In addition to this—its main object—lectures of a popular nature by eminent zoologists will be arranged. The headquarters of the society, and the first and principal garden, will be at Edinburgh. To obtain the necessary capital a garden fund has been opened, to which donations are solicited. The annual subscription is *£1. 1s.*, but members who join the society during 1909 pay *10s.* only for that year. This will entitle members to all the privileges usual in such a society. The aim of the promoters is to build up a strong society with a large membership, so that a considerable part of the annual sum required for the upkeep of the gardens will be ensured from subscriptions, and less dependence will require to be placed on the receipts from the public for admission.

IN a lecture given at the Bradford Technical College on science and the textile industries, Mr. W. P. Dreaper suggested the formation of central trade laboratories to deal with the pressing need for technical research. The laboratories were to be established privately, and subsidised by the trade concerned, any associated firm being at liberty to bring forward technical problems for solution. The plan proposed appears only to be practicable in the case of a highly organised trade, since there would be great difficulty in inducing individual firms to support such a scheme, which they would think might easily be to the advantage of their competitors rather than of themselves. On the other hand, when a trade becomes highly organised and centralised its interests tend to become so amalgamated that a central laboratory will be established almost as a matter of course, and there are already several examples of such a development. Any suggestion for widening the basis of technical research is, however, welcome, and we hope that further discussion and inquiry may show Mr. Dreaper's scheme to be feasible.

THE sixty-second annual meeting of the Palæontographical Society was held in the rooms of the Geological Society, Burlington House, on March 19, Dr. Henry Woodward, F.R.S., president, in the chair. The report of the council referred to the completion of the monograph of Cretaceous star-fishes, and to the satisfactory progress of the monographs of Cretaceous lamellibranchs, Chalk fishes, Cambrian trilobites, and British graptolites. Many offers of new monographs had been received, but the council had decided, so far as possible, to complete the works in progress before entering on new undertakings. Sir Archibald Geikie, P.R.S., was elected a vice-president in succession to the late Mr. W. H. Hudleston, and Prof. E. J. Garwood, Mr. C. Fox Strangways, and Mr. F. R. Cowper Reed were elected new members of council. The officers were re-elected, Dr. Henry Woodward as president, Dr. G. J. Hinde as treasurer, and Dr. A. Smith Woodward as secretary.

MUCH interest has been aroused in Sussex by the discovery of the greater part of a skeleton of a mammoth (*Elephas primigenius*) on the shore of Selsey Bill. The remains were found below high-water mark in the estuarine or fresh-water deposit of black clay, which underlies the raised beach and coombe rock on that part of the Sussex coast. The thick mass of shingle, which usually covers this deposit, was temporarily removed during the recent stormy weather, and the teeth and broken bones were found projecting from the clay. Probably the whole skeleton was originally present, but when found the bones were already much eroded, and they were scattered over an area about 30 feet square. Both upper and lower molar teeth were recovered, and their condition shows that the animal was immature and of small size. Fragmentary remains, both of the mammoth and of *Elephas antiquus*, have been found at various times in the same deposit in Bracklesham Bay, some of these specimens being now in the British Museum. Indications of complete skeletons are rare. They seem to have been recorded only twice in England, the first in the brick-earth of Ilford, Essex, the second in a corresponding deposit at Ealing, Middlesex.

TOWARDS the scientific exploration of Spitsbergen no nation has contributed in a greater degree than Sweden. During the last half-century no less than twenty-four Swedish expeditions have visited it and the adjacent islands, at a cost of at least 75,000*l.*, to which another 25,000*l.* must be added if the expense of publishing the results be

reckoned. Signs are not wanting, however, that much of the valuable work accomplished by the Swedes is unknown to the scientific men of other countries. To remedy this, Profs. A. G. Nathorst and G. de Geer, and Dr. J. Gunnar Andersson, have just published in *Ymer* (1909, Häft i.) a brief English summary of the work, occupying ninety pages, and have distributed reprints. This comprises a historical sketch by Prof. Nathorst, illustrated by maps and views of the Swedish stations; a list of men of science, physicians, and officers who have taken part in the expeditions; a classified and annotated bibliography by Mr. J. M. Hulth, containing 376 items; and a list of sixty maps by Prof. de Geer. In 1908 it was 150 years since the first Swedish naturalist, A. R. Martin, instigated thereto by Linnæus, set foot on Spitsbergen; but the true foundation of Swedish exploration was laid by Sven Lovén, when in 1837 he undertook a two months' voyage thither on his own initiative and at his own expense. The subsequent record is one of which any country might be proud, and English geographers and naturalists in particular should thank their Swedish colleagues for abandoning their habitual modesty so far as to publish this concise account.

WITH great regret we have noticed the announcement of the death of Senhor Joas Barbosa Rodriguez, director of the Botanic Garden and professor of botany in the university at Rio de Janeiro. Barbosa Rodriguez was born in the State of Minas Geraes in 1842. After a varied career as secretary, drawing master, traveller, manager of a chemical factory, and director of a museum at Mañaos he was, in 1889, appointed director of the Botanic Garden at Lagos de Rodrigo de Freitas, near Rio de Janeiro, a post which he held until his death. Numerous and extensive journeys took him over a great part of the Amazon basin, and later on also the southern States, Uruguay and Paraguay. One might have expected that large collections would have resulted from those expeditions; but his artistic inclinations—he handled pencil and brush with considerable facility—and his predilection for studying plants on the spot and from life led him rather to fill his portfolios with sketches and analyses and his note-books with descriptions from the living material. His favourite plants were Orchidaceæ and Palmæ, and his publications on them will always rank among the most valuable contributions to our knowledge of those families, even if we admit the disadvantages of his method, which involved a certain neglect of the documentary evidence accumulated in the herbaria of Europe. He was a fertile writer, and his publications extend beyond botany into the domains of archæology, palæontology, ethnography, and the Indian languages. He intended to publish a complete iconographia of the Orchidaceæ of Brazil. To that end he amassed a large collection of drawings, all from life and by his own hand; however, their publication was beyond his means. Only a volume of descriptions appeared, whilst with great magnanimity he placed his illustrations, amounting to between 500 and 600 sheets, at the disposal of Prof. Cogniaux, who had undertaken to elaborate the family for the "Flora Brasiliensis." He was, however, more fortunate with his great work on the palms of Brazil. Congress having passed a special vote for its publication, it appeared in two huge folio volumes (pp. 140 and 114, with 91 and 83 chromolithographs) in the following year. In him Brazil has lost a good botanist and a man of many accomplishments.

A LETTER from Mr. Edgar R. Waite, curator of the Canterbury Museum, Christchurch, New Zealand, asking for information as to the length of skeletons of great whales

preserved in museums, was published in *NATURE* on November 26 last (vol. lxxix., p. 98). It will be remembered that a blue whale cast on to the beach at Okarito, on the west coast of South Island, New Zealand, was measured by Mr. Waite and found to be 87 feet in length. A reply to this letter has been received from Mr. F. A. Lucas, curator-in-chief of the museum of the Brooklyn Institute of Arts and Sciences, New York, in which he states that in 1903 he measured a number of blue whales taken off the coast of Newfoundland. Of twenty-six whales measured, only six reached a length of 74 feet, from the tip of the nose to the notch of the fluke, the tape-line being carried along the side of the body. The six whales ranged in length from 74 feet 4 inches to exactly 75 feet. Adding to this the under-hang of the lower jaw, which is 1 foot 4 inches, and the depth of the fork of the flukes, which is 2 feet 6 inches to 3 feet, a total length for the largest whale of a little under 80 feet was obtained. Mr. Lucas points out that the measurements taken from a mounted skeleton are of little value, as the inter-vertebral cartilage is made too thick almost invariably. Mr. Lucas's letter was submitted to Mr. Waite, who, in his reply, says he is at present unable to give the exact length of the skull of the Okarito whale, but the length of the ramus of the lower jaw in a straight line is 20 feet 8 inches, and round the outer curve 22 feet 6 inches. Respecting the statement that there is the skeleton of a whale in Copenhagen 150 feet in length, Mr. Waite adds he has received a private letter from Prof. Jungersen saying the largest whale in the Copenhagen collection measures 75 feet.

WE have received a copy of the report of the Maidstone Museum, Library, and Art Gallery for 1908. As regards the museum, the year has seen an important advance in the arrangement and display of the collections, more especially those of minerals and fossils. In response to an appeal for providing cases for the Kent county room, the amount available for that excellent purpose is now just more than 174l.

A STRONGLY endorsed appeal has just been issued at Berlin for the purpose of obtaining funds for the fitting up of the Phylogenetic Museum recently established by Dr. Ernst Haeckel at Jena. Preparations, models, and diagrams for the proper illustration of phylogeny are urgently needed, and for this purpose a sum of 5000l. is required, in addition to the funds already expended or in hand. The appeal is backed by a number of the leading German professors and teachers.

IN vol. xcii., part ii., of *Zeitschrift für wissenschaftliche Zoologie*, Dr. F. Fritz, of Stuttgart, describes the carpal vibrissæ and underlying structures situated on the under surface of the lower part of the fore-arm of the cat. These vibrissæ are connected with a dermal sinus supplied by a relatively large branch of the ulnar nerve. Beneath the sinus occur structures of the so-called "lamellen Körperchen" type, and the vibrissæ themselves contain minute sweat-glands. The whole organ, the details of which are fully described in the paper, is evidently sensory in function. It is suggested that the presence of such vibrissæ in most Carnivora and their absence in Ungulata is connected with the active functions of the claws of the former. In the introduction to his paper the author mentions that these vibrissal organs have an important bearing on the nature of the callosities on the limbs of the horse, and it may be inferred, although this is not definitely stated, that he regards the latter as the degenerate representatives of the former. Several papers on the nature of the equine callosities are quoted, but no

reference is made to one by Mr. Lydekker, in which these structures are regarded as degenerate glands—an interpretation not far from the one apparently adopted by the author.

THE advice given by Mr. G. G. Lewis in the *Amateur Photographer*, that tree outlines provide a suitable study for the landscape photographer in spring, can be thoroughly endorsed, but it will be apparent from the snapshots reproduced that photographs should be taken of the whole tree where possible. All the trees mentioned can be found in or around London. With regard to the specific outlines of different trees, it should be the aim of the photographer to evolve these from his own prints.

THE spit of land known as Wilson's Promontory has been reserved by the Government of Victoria as a national park, and the authorities of the Victorian National Herbarium have been deputed to make a botanical survey of the area. The first report by Prof. A. J. Ewart regarding the plants collected on an expedition in 1908 is published in the *Victorian Naturalist* (January). The list consists of 350 phanerogams and ferns, including a dozen naturalised aliens. The rarest species are *Fieldia australis* and *Xanthosia tridentata*. The reserve contains many fine trees, amongst which are specimens of *Eugenia Smithii*, the bright flowering *Coirea speciosa*, *Banksia serrata*, *Prostanthera lasiantha*, *Acacia melanoxylon*, *Hedycarya Cunninghamii*, *Eucalyptus globulus*, *E. amygdalina*, and *E. obliqua*.

UNDER the title of "Flora von Paderborn," Dr. M. P. Baruch contributes to the *Verhandlungen des naturhistorischen Vereins der preussischen Rheinlande und Westfalens* (part i, 1908) an account of the general features of the vegetation, and a list of plants collected in the north-east of Westphalia. The scene is a sandy and marshy tract forming part of the Münster inland "bay," where *Scleroderma verrucosa*, *Polytrichum piliferum*, and *Racomitrium canescens* are typical cryptogams in the sand-dunes, and *Myrica gale* grows by the streams. In the neighbourhood of Salzhotten, where salt is worked, *Aster Trepolium*, *Samolus Valerandi*, *Triglochin maritimum*, and other halophytes may be collected. *Aconitum bycoctonum*, *Thalictrum flavum*, *Galium boreale*, and *Serratula tinctoria* are noted as rare plants in the district. The ridge known as the Haarstrang provides chalky soil where many calciphilous plants are to be found.

THE subject of the latest issue—a double number—of the *Vegetationsbilder*, published by Gustav Fischer, Jena, is the volcanic region of Java and Sumatra, including the adjacent island of Krakatau, for which Dr. A. Ernst has supplied the material. The first set of illustrations represents the strubby vegetation in the craters of extinct volcanoes, where the composite *Anaphalis javanica* takes a prominent place. The vegetation of the sulphur and hot springs is too diverse to be discernible in a photograph, but an expanse of *Acorus calamus* on a crater lake is depicted. The next topic is the colonisation of land that has been devastated by eruptions. The photographs taken on Mount Gunung Guntur, the scene of eruptions in the years 1840 to 1847, show masses of *Imperata arundinacea* and *Saccharum spontaneum* in which a few bushes are gradually forcing their way. The last illustrations taken from the island of Krakatau indicate the remarkable growth made since the eruption in 1883. The littoral formation of *Ipomoea pes-caprae* is well established, and behind rises a belt of trees. The author states that he collected 92 phanerogams and 16 ferns; of the former he estimates that about 55 per cent. were sea-borne, 25 per cent. wind-borne, and about 15 per cent. were introduced by birds.

It is well known that the common crow is omnivorous, and occasionally preys on young birds; two instances are recorded in the report of the Rhode Island Agricultural Experiment Station, where serious losses were caused to poultry-keepers by crows. During the three and a half months from April 1 to July 10 no fewer than 100 chickens are said to have been taken from one farm. The larger ones, some of which were a pound in weight, were killed and eaten where they were caught; the smaller ones were carried away. On another farm 180 ducklings out of 205 were killed. The only effective way of stopping the damage was to shoot a crow and hang up the dead body.

MESSRS. FAGAN AND ALLAN recently issued as Bulletin No. 16 of the Edinburgh and East of Scotland College of Agriculture a useful list of analyses of brewers' and distillers' grains, materials which are largely used as feeding-stuffs in farm practice. The analyses usually quoted in text-books are old, and were probably made before the practice of using light, husky barleys for brewing became common. The average results were as follows:—

	Brewers' grains						Distillers' grains	
	1 Old average	2 26 recent samples	3 Limits of Variation		5 Wet grains	6 Dried grains	7 Wet	8 Dry
			Max.	Min.				
Oil	7'72	4'99	7'00	2'70	1'20	4'56	1'42	5'45
Nitrogenous matter	22'76	20'61	23'12	17'56	4'98	18'85	4'48	17'15
Nitrogen free extract	46'77	48'87	53'22	43'30	11'83	44'74	13'02	49'77
Fibre	17'56	21'03	23'40	17'61	5'08	19'24	4'23	16'18
Ash	5'19	4'50	5'50	3'70	1'08	4'11	0'77	2'95
Water	—	—	—	—	75'83	8'50	76'08	8'50

Nos. 1, 2, 3, and 4 show the composition of the dry matter, Nos. 5 and 7 represent the average of a number of samples as received from the brewery or distillery, and Nos. 6 and 8 show what these samples would contain if sold as dried grains with 8.5 per cent. of water.

In the March number of *Man* Dr. Seligmann gives an interesting account of a curious series of canoe ornamental carvings from south-eastern British New Guinea. They are known at Murua under the name of *munkuris*, and represent in one series the reef heron, the wings of which are joined to support a specimen of a variety of fish said to be found in mangrove swamps. In others the cockatoo, with its crests well defined, or the tern is the subject of the carving. The reef heron and the cockatoo are well-known totems in this district; but this is not the case with the tern. The supposed efficacy of these carvings cannot, then, be ascribed to totemism. It looks rather as if this were one of the many cases of mimetic magic. The carving of the fish may denote a desire that the canoe may glide with safety through the water; it is to swim over the surf with the grace, ease, and rapidity of the reef heron or the tern. Needless to say, these things are highly valued, and the specimens collected in the Daniels expedition, which are now in the British Museum, are of exceptional interest.

It has been asserted by M. L. Sainéan in his "L'Argot Ancien" (Paris, 1907) that we have no knowledge of any artificial language in Europe before the fifteenth century. This view is contested by Prof. Kuno Meyer in the January number of the *Journal of the Gypsy-love Society*. He points out that most of the processes in the manufacture of artificial language are described minutely and with examples in the commentary, dated in the eleventh century, on the Irish composition called "Amra Choluimb

Chille," a eulogy on St. Columba composed in the ninth century. Much later than this we have another artificial Irish language called Ogham, of which he gives an interesting example in facsimile from the original in the library of Trinity College, Dublin.* Of the two living secret languages current in Ireland, one, Shelta, discovered by Mr. G. G. Leland, has been proved by Mr. J. Sampson to be a deliberate and systematic modification of Irish Gaelic at an early period of its growth. Of the second, known as Béarlagar na Saor, the information is still scanty. It seems to be mainly confined to Cork and Waterford, where a few sentences are known by most masons, though they cannot always explain the words. It is to a large extent a borrowed tongue, from genuine archaic Irish, Irish words used in a figurative sense, from foreign languages, such as Hebrew, and it has added many words modified by back spelling. Prof. Meyer promises a further discussion of this question, interesting both to the philologist and the student of social history.

THE Bulletin of the Sleeping Sickness Bureau (No. 4, February) contains abstracts of recent papers on trypanosomiasis and its treatment, notably one by Ehrlich on chemotherapy.

SEVERAL important contributions to medical science appear in the *Philippine Journal of Science* for November, 1908 (iii., No. 5). Messrs. Marshall and Teague discuss the precipitin and complement fixation reactions, especially in their forensic application in the recognition and differentiation of blood stains, and Mr. Garrison describes a new intestinal trematode parasite of man (*Fascioletta ilocana*), for which a new genus is created.

DR. F. EREDIA has sent us a copy of his laborious discussion of the temperature at Rome for the fifty years 1855-1904, being an extract from vol. xxviii. of the *Annals of the Central Meteorological Office of Italy*. The tables exhibit for each of those years (1) ten-day means; these show that the warmest epoch is the third decade of July, the mean being 77°·4 F., the coldest being 43°·7, in the second decade of January. (2) Mean values of maxima and minima for each decade; the epochs agree with those above mentioned, being respectively 87°·6 and 38°·3. (3) Mean monthly and yearly values; the warmest month is July, average 76°·6, the coldest, January, average 44°·1. The mean annual temperature is 59°·7. (4) Absolute extremes for months and years, with dates of occurrence; maximum, 104°·2, July, 1905, minimum, 20°·8, February, 1885, giving an extreme range of 83°·4 F. The author has grouped the values in various ways to find any relation between them and the frequency of sun-spots, but with a negative result. The discussion contains many interesting details to which special reference cannot be made here.

THE *Geographical Journal* for March contains a very useful paper by Mr. G. B. Williams on the mean annual rainfall of Wales and Monmouthshire. The map which accompanies the paper shows the geographical distribution in that locality in greater detail than in any map hitherto published, and gives the areas having an annual rainfall below 30 inches, and those for each additional 10 inches up to 100 inches, the localities with 100 inches to 150 inches and above that amount. It has been prepared chiefly from the data given annually in "British Rainfall" for a period of thirty-five years, viz. 1872-1906 in North Wales, and 1868-1902 in South Wales and Monmouthshire. A large number of short records had to be "standardised" by comparing them with those of long and trustworthy means. The isohyets, or lines of equal rainfall, bear

obvious relationship to the contour lines, but it is by no means a constant one, owing to the positions of the mountains and the local air currents. The wettest parts include the portion of the Carnarvon mountains within a radius of about two miles from the centre of Snowdon, in which area the average fall is more than 150 inches per annum; at Glaslyn, on the lee side of the summit, and within the Snowdon crater, the mean rainfall is apparently 197 inches. An area of about 167 square miles on these mountains has a rainfall of more than 100 inches per annum. In South Wales, at the Bwlch Pass, the mean is about 130 inches. Over the whole country, the fifteen years 1872-86 had an average annual fall of 110.14 per cent., and the fifteen years 1887-1901 had 91.44 per cent., of the mean. Many localities are still poorly provided with rain-gauges; no record appears to be kept on Cader Idris.

THE *Electrical Review* for March 5 devotes three pages to reports of the discussions at London, Manchester, and Dublin of the paper on the use of large gas engines for the generation of power, read last month before the Institution of Electrical Engineers by Messrs. L. Andrew and R. Porter. In a leading article on the subject it points out how little has been done in this country to make gas engines of more than 1000 horse-power a success, and attributes this state of affairs to a tendency of our fellow-countrymen to leave other countries to do the pioneering work, and to hope to take up the subject when the main difficulties have been overcome. In its condemnation of this practice the *Electrical Review* has our cordial support.

PARTS viii., ix., and x. of vol. xlv. of the Proceedings of the American Academy of Arts and Sciences consist of papers by Mr. P. W. Bridgman, of the Jefferson Physical Laboratory of Harvard University, dealing with high hydrostatic pressures. The first describes a primary mercury gauge in which the pressure of the mercury on a piston, kept in rotation to minimise friction effects, is balanced by weights. By means of this gauge pressures up to 7000 kilos. per square cm. may be determined to an accuracy of one-tenth per cent. The second describes a gauge in which the change of the electrical resistance of mercury under pressure is utilised to determine the pressure. The author finds that at 7000 kilos. per square cm. the resistivity of mercury is reduced to 0.83 of its value at atmospheric pressure. In the third paper the apparatus used in the measurement of the compressibilities of certain solids and liquids is described. For solids, a bar of the material is enclosed in a strong cylinder of steel, and is pressed against one end of the cylinder by a spring. The other end of the bar carries a brass ring which is in contact with a shoulder in the cylinder. When the bar is compressed the ring is forced along it, and the extent of the motion gives the difference between the changes of length of bar and cylinder. The latter is measured by microscopes outside the cylinder. In this manner the compressibilities of steel, aluminium, and glass have been determined by Mr. Bridgman.

A PAPER on hydroplanes, or skimmers, was read by Sir John I. Thornycroft, F.R.S., at the Model Yacht Club on March 4. Any vessel which greatly reduces its displacement at high speeds is generally called a hydroplane, but as the gliding surfaces are not always plane, skimmer is a more appropriate term. Steady gliding on the surface of water is difficult to secure; this may probably be obtained by the use of a number of planes, but at the expense of more power. Mr. Froude was of opinion that a single plane was best, but this must maintain a particular angle

to the water surface. In a boat intended for skimming there are a number of elements to be considered, which, unfortunately, do not all lead to the same proportions of design. The lifting force depends on the amount of surface and the speed, while the friction for a certain amount of surface decreases with the length. Again, the speed at which skimming will commence increases with the length; naturally this limit should be kept as low as possible. Below a certain velocity the formation of large waves causes bad performance in skimmer models; this difficulty may be lessened by extending the amount of supporting surface or by reducing the weight of the vessel, the surface remaining the same. A boat very wide and short in shape leads to excessive air resistance—an important factor at speeds of thirty miles per hour. The author gives the results of much of his experience with models. The complete paper, together with the lines and a photograph of the successful motor-boat *Gyrinus* at full speed, the latter, built by the author's firm, having won the International Race for 8-metre boats last year, will be found in *Engineering* for March 12.

IN the issue of *NATURE* for February 11 last (vol. lxxix., p. 438) a note was published dealing with the general report on the operations of the Survey of India administered under the Government of India during 1906-7. A remark in the note concerning the pendulum experiments carried out states that "the results obtained have been found to agree with those obtained by Prof. Hecker in 1905." Major Lenox Conyngham points out to us that this remark is calculated to give the impression that the Survey of India had merely been going over ground already traversed by Prof. Hecker, whereas the reverse was the case. The words of the report are:—"The results of Prof. Dr. Hecker's observations at Jalpaiguri in 1905 have been received and found to agree perfectly with those of Major Lenox Conyngham."

It will be remembered that the centenary of the Geological Society of London was celebrated in 1907. Articles dealing with the celebration proceedings appeared in the issues of *NATURE* for August 1 and October 3, 1907 (vol. lxxvi., pp. 317 and 569). Messrs. Longmans, Green and Co. have now published for the Geological Society a detailed account of the varied meetings, held from September 26 to October 3, 1907, in honour of the occasion. The volume, which runs to 166 pp., and costs 2s., has been compiled by the senior secretary of the society, Prof. W. W. Watts, F.R.S., and includes an exhaustive account of the excursions, the reception, the congratulatory letters and addresses, the presidential address, the social functions, and the visits of the guests of the society to the Universities of Oxford and Cambridge. An excellent portrait of Sir Archibald Geikie, K.C.B., president of the Royal Society, forms the frontispiece to what is in every way an interesting memorial of an important celebration.

A FIFTH edition of the late Mr. Catchpool's "Text-book of Sound" has been published by Mr. W. B. Clive. The work has been revised and enlarged by Mr. John Satterly. The revision has consisted more of additions than of alterations, and these include many instructive experiments, with descriptions of apparatus and manipulation.

AMONG the forthcoming publications of the Society for Promoting Christian Knowledge are:—"The Spectroscope and its Work," by Prof. H. F. Newall, F.R.S., and "English Wild Flowers," by Prof. Henslow, with more than 200 coloured illustrations of plants, natural size, drawn by G. Layton.